

down of 14 feet of water in one pool of great storage capacity, also unreported. The filling of this pool after the rains materially reduced the sharp rise in the river, and another pool farther down further flattened the flood crest that remained.

Warnings of marked rises were also issued on the 17th for the lower Saluda, lower Broad and Congaree Rivers of South Carolina. These warnings were justified. Copious rains below Camden and Columbia, S. C., also caused moderate flood stages in the Santee River. There was no loss or damage.

Moderate local floods occurred in the Scioto River of Ohio on the 23d and 24th, but apparently no damage was done.

For the first time in the history of the Bismarck, N. Dak., station, warm weather caused the early breaking up of the ice in the Missouri River after it had been frozen to such an extent that teams and automobiles could cross. This occurred on November 15, 23, and 27, at Williston, N. Dak., and at points below on November 29. Warnings of the coming of the ice and rising waters were issued a sufficient time in advance for precautionary measures to be taken. A new highway bridge is in course of construction across the Missouri River at Bismarck, and the timely warnings enabled the workmen to escape with their lives. The only damage was the tearing out of the trestle of the new bridge, and amounted to only a few thousand dollars. After the ice passed out a steamboat was brought up from Deapolis to Bismarck, marking the latest navigation ever known on the Missouri River in North Dakota.

The moderately high stages in the lower Trinity River of Texas during the early days of the month were forecast in the latter part of October. There was no damage of consequence, as live stock had previously been removed to places of safety.

The only other floods occurred in the upper Sacramento and the Willamette Rivers. The flood in the upper Sacramento was caused by torrential rains that began on November 15 and continued until late evening of November 20. The 24-hour rainfalls at Kennett, Calif., during this period were as follows:

	Inches.
16th.....	4.70
17th.....	6.50
18th.....	7.84
19th.....	4.34
20th.....	4.38
21st.....	2.85
Total.....	30.61

Below Kennett the rainfall did not average more than 6 inches. The river was at very low stage when the rains began, and flood warnings were issued on the 18th for Red Bluff and Tehama, Calif.

The crest stage at Red Bluff was 23.2 feet, 0.2 foot above the flood stage, at 5 a. m., November 19, with a proportionate rise at Tehama. The crest at Knights Landing, Calif., was 17.2 feet, 0.8 foot below the flood stage, at noon, November 22, and at Sacramento 22.8 feet, 6.2 feet below the flood stage, at 4 p. m., November 23.

Although but little water escaped over the levees along the lower river, local drainage caused considerable damage to the rice and bean crops, about 40 per cent of which had not been harvested. The value of property saved through the warnings, mainly in the shape of live stock, was not less than \$50,000. A few cattle, sheep, and hogs were drowned.

The flood in the Willamette River was a local one, with flood stage at Eugene, Oreg., only, where the crest stage was 11.5 feet, 1.5 feet above the flood stage, on November 27. This flood was caused by almost persistent, although not very, heavy rains during the second and third decades of the month. No damage was reported.

#### MEAN LAKE LEVELS DURING NOVEMBER.

By UNITED STATES LAKE SURVEY.

[Dated: Detroit, Mich., Dec. 3, 1920.]

The following data are reported in the "Notice to Mariners" of the above date:

Data.	Lakes. <sup>1</sup>			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during November, 1920:				
Above mean sea level at New York.....	<i>Feet.</i> 602.48	<i>Feet.</i> 580.30	<i>Feet.</i> 571.95	<i>Feet.</i> 245.23
Above or below—				
Mean stage of October, 1920.....	—0.20	—0.25	—0.10	—0.06
Mean stage of November, 1919.....	+0.03	—0.12	—0.27	—0.88
Average stage for November, last 10 years.....	—0.04	+0.02	+0.08	—0.41
Highest recorded November stage.....	—1.03	—2.62	—1.72	—2.59
Lowest recorded November stage.....	+0.98	+1.12	+1.25	+1.82
Average relation of the November level to—				
October level.....	—0.20	—0.30	—0.20	—0.20
December level.....	+0.20	+0.10	+0.10	+0.20

<sup>1</sup> Lake St. Clair level: In November, 574.97 feet.

#### EFFECT OF WEATHER ON CROPS AND FARMING OPERATIONS—NOVEMBER, 1920.

By J. WARREN SMITH, Meteorologist.

For the most part the weather during November, 1920, was favorable for outdoor operations, although work was delayed in portions of the South by considerable wet weather, while the low temperatures in central and northern States during the second decade were unfavorable for farm work. Rainfall was heavy in much of the Atlantic coast section the latter half of the month, but the weather was mostly fair throughout the month from the Mississippi Valley westward to the Rocky Mountains.

It was favorable for harvesting and drying corn in most of the principal corn-growing States and satisfactory progress was made in harvesting the crop. Considerable corn was reported soft and chaffy in some central Mississippi Valley districts.

Heavy rain in the eastern and northeastern portions of the cotton belt the latter part of the month delayed picking in that section, but otherwise the weather was mostly favorable for gathering cotton still in the field. Picking progressed slowly, however, in the northwestern portion of the belt, and the staple of the unpicked cotton steadily deteriorated on account of its exposure to the weather. Considerable low-grade cotton was abandoned in Texas.

Winter grains continued to make satisfactory progress throughout the month in nearly all sections of the country under the influence of generally favorable weather. At the close of the month winter wheat was in good to excellent condition and was steadily improving, although rain was needed in a few interior sections. The general